

**REMARKS**

This is intended as a full and complete response to the Notice of Non-Compliant Amendment dated July 3, 2007, having a shortened statutory period for response set to expire on August 3, 2007. Please reconsider the claims pending in the application for reasons discussed below.

Applicants submit that the above-referenced application is a U.S. National Phase application based on International Application No. PCT/NO2004/000288 as published in International Publication No. WO 2005/032002.

Upon electronic filing of the application, the incorrect application number of PCT/US2004/000288 was entered in place of the correct application number of PCT/NO2004/000288. Applicants submit that this error was unintentional.

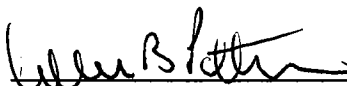
The International Publication No. WO 2005/032002 submitted at the time of filing correctly states the international application as PCT/NO2004/000288, a copy of which is attached. A petition to correct this error is currently pending before the PCT legal department to rectify this error.

Applicants believe that a complete listing of all the claims 1-4 is present.

**Conclusion**

Having addressed all issues set out in the office action, Applicants respectfully submit that the claims are in condition for allowance and respectfully request that the claims be allowed.

Respectfully submitted,



William B. Patterson  
Registration No. 34,102  
PATTERSON & SHERIDAN, L.L.P.  
3040 Post Oak Blvd. Suite 1500  
Houston, TX 77056  
Telephone: (713) 623-4844  
Facsimile: (713) 623-4846  
Attorney for Applicants

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
7 April 2005 (07.04.2005)

PCT

(10) International Publication Number  
**WO 2005/032002 A1**

(51) International Patent Classification: **H04B 7/185,**  
**H04Q 7/22, 7/30**

(21) International Application Number:  
**PCT/NO2004/000288**

(22) International Filing Date:  
29 September 2004 (29.09.2004)

(25) Filing Language: Norwegian

(26) Publication Language: English

(30) Priority Data:  
20034333 29 September 2003 (29.09.2003) NO

(71) Applicant (for all designated States except US):  
**MARITIME COMMUNICATIONS PARTNER AS**  
[NO/NO]; Televeien 3, N-4879 Grimstad (NO).

(72) Inventors; and

(75) Inventors/Applicants (for US only): **HAGLUND,**

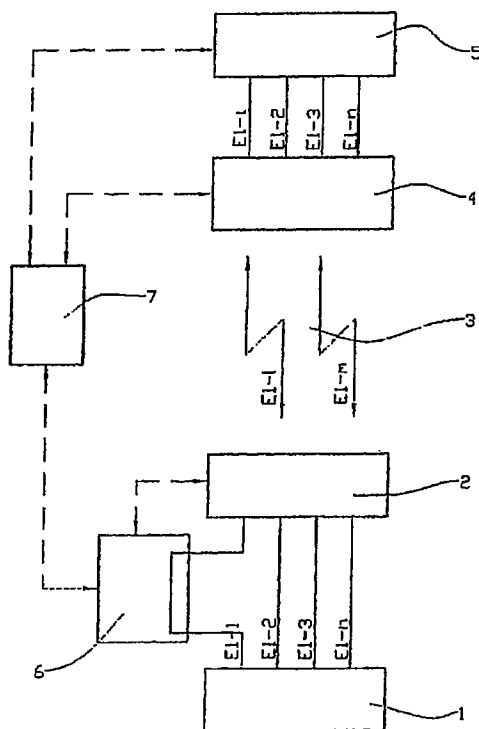
Svein [NO/NO]; Fredensvei 4, N-4836 Arendal (NO).  
GUSTAVSEN, Trygve, Sten [NO/NO]; Skibberhei 9,  
N-4817 His (NO). KJELLSTADLI, Kjetil [NO/NO];  
Skiberheimet 4, N-4817 His (NO). LIEN, Sjur, Thomas  
[NO/NO]; Bråstad, N-4848 Arendal (NO). HØGSAAS,  
Trond [NO/NO]; Børge Trollesvei 9, N-4823 Nedenes  
(NO). REFSTIE, Knut, Einar [NO/NO]; Sørmsveien  
18, N-4870 Fevik (NO). FJELLHEIM, Knut [NO/NO];  
Åsveien 21, N-4817 His (NO)

(74) Agent: **HÅMSØ PATENTBYRÅ ANS**; P.O. Box 171,  
N-4302 Sandnes (NO).

(81) Designated States (unless otherwise indicated, for every  
kind of national protection available): AE, AG, AL, AM,  
AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN,  
CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI,  
GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE,  
KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD,  
MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG,

[Continued on next page]

(54) Title: METHOD FOR REDUCING THE TIME DELAY IN A TELEPHONE SYSTEM



(57) Abstract: A method of switching a speech channel in a mobile telephone system comprising an interface between a Base Station System (BSS) (1) communicating with a Mobile Switching Center (MSC) (5) via a transmission connection (3), where the speech channels of an originating subscriber (8) and a dialled-up subscriber (9), both of whom are located on the BSS (1) side of the transmission connection (3), are connected in a local switcher (2).

WO 2005/032002 A1

PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

(84) *Designated States (unless otherwise indicated, for every kind of regional protection available):* ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI,

**Published:**

— with international search report

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## METHOD FOR REDUCING THE TIME DELAY IN A TELEPHONE SYSTEM

This invention regards a method for reducing the time delay in a telephone system. More particularly, it regards a method for reducing the audible time delay that occurs when the signals are transmitted e.g. via a satellite channel. In the following, reference is made, for illustrative purposes, to a satellite connection or channel. Satellite connection is here taken to mean an entire satellite system comprising multiplexers (MUX), antennas and satellite.

10 In the following, reference is made, for illustrative purposes, to a GSM system (GSM - Global System for Mobile Communication) which employs a so-called A-interface between a Base Station System (BSS) and a Mobile Service Switching Centre (MSC). In conventional mobile telephony all calls are  
15 connected in the Mobile Service Switching Centre.

Under normal circumstances such a solution is acceptable, but when the BSS and the MSC communicates e.g. via a satellite connection, an audible time delay in the order of 0.5 seconds will arise.

Typically, this is a problem when the BSS is located on a ship and the MSC is on shore.

The time delay doubles when both parties are on the same side of the satellite connection, as the signals must then first  
5 be sent via the satellite connection to the MSC and then return to the BSS via the same satellite connection.

The object of the invention is to remedy the disadvantages of prior art.

The object is achieved in accordance with the invention, by  
10 the characteristics stated in the description below and in the following claims.

According to a standardized protocol for telephone systems of this type, signalling and speech are separated into two separate channels, a signalling channel and a speech channel.  
15 Thus it is possible to process data transmitted via the speech channel without interfering with the signalling channel.

When two persons on the same side of a satellite connection call each other, the speech channels can be connected by use  
20 of a local change-over switch or switcher, while the signalling channel is transmitted to the MSC via the satellite connection. Thus the speech channel is not transmitted via the satellite connection and therefore is not subject to said time delay.

25 Monitoring and analysis of the data stream in the signalling channel between the BSS and the MSC makes it possible to extract any data indicating that a call should be switched locally, whereupon the respective speech channels are connected locally.

A further advantageous feature of the invention is that the transmission capability requirement of the satellite connection is reduced.

5 An A-interface (interface) for communication between a BSS and a MSC comprises a number of TDM (time-division multiplex) connections. By concentrating the number of calls routed via the satellite connection to a smaller number of TDM links at the BSS in order then to expand these concentrated TDM links to the initial number at the MSC, it becomes possible to save  
10 transmission capability in the satellite connection. Thus, TDM time slots not transmitted to the MSC can be used for local calls.

In a conventional mobile telecommunication system the capacity is determined by the total number of TDM time slots and  
15 links between the BSS and the MSC.

In those cases where all TDM time slots in said concentrated transmission connection are being used, the conventional mobile telecommunication system will attempt to set up more calls if there are any free TDM time slots for local calls.  
20 The reason for this is that a conventional MSC will not be able to keep track of which calls are local and which are long distance calls, and in consequence, nor will it know the capacity situation in the transmission connection.

The invention comprises a method of preventing the MSC from  
25 attempting to set up further calls when the capacity of the transmission connection is fully utilised.

The following describes a non-limiting example of a preferred method illustrated in the accompanying drawings, in which:

Figure 1 shows the principal components of a telephone system according to the invention;

Figure 2 shows the transmission paths of the signalling and speech channels according to prior art; and

5 Figure 3 shows the transmission paths of the signalling and speech channels according to the invention, the transmission path of the signalling channel being illustrated by a broken line.

10 In the drawings, reference number 1 denotes a BSS of a type that is known *per se*. The BSS 1 communicates with a local change-over switch or switcher 2 via a plurality of channels E1-1 to E1-n, where n is a selected number.

The local switcher 2 communicates via a transmission system 3, here in the form of satellite communication, with a remote  
15 switcher 4 via a plurality of channels E1-1 to E1-m, where 1 and m are selected numbers.

The remote switcher 4 communicates via a plurality of channels E1-1 to E1-n with an MSC 5 of a type that is known *per se*. The channels E1-1- to E1-n between the remote switcher 4  
20 and the MSC 5 correspond to the channels E1-1 to E1-n between the BSS 1 and the local switcher 2.

A TDM time slot monitor, decoder and analyser 6, hereinafter denoted TDM analyzer or optionally analyzer, is connected to the channels between the BSS 1 and the local switcher 2. In  
25 Figure 1 this is illustrated by channel E1-1 being connected to the TDM analyzer 6.

The TDM analyzer 6 communicates with the local switcher 2 and with the remote switcher 4 and the MSC 5 by means of a TCP/IP

(Transmission Control Protocol/Internet Protocol) connection/network 7.

The TDM analyzer 6 constructs a local database of so-called IMSI (International Mobile Subscriber Identity) and MD-ISDN (Mobile Station - Integrated Services Digital Network) number  
5 for each mobile telephone associated with the BSS 1.

The IMSI number is read from the signalling message 'location Updating Accept', while MS-ISDN is obtained from the MSC  
5 by making an inquiry using the IMSI number as a reference.

10 Then the TDM analyzer 6 establishes a temporary list of all subscribers attempting to set up calls, hereinafter denoted A-subscribers 8, in the MSC 5.

The following A-interface messages are monitored in order to obtain the required information, the nature of the information being indicated in brackets:  
15

4. Cm\_service\_request (A-IMSI)
5. Connection\_confirmed (logical signalling link Id)
6. Setup (MS-ISDN for B-subscriber)
7. Assignment\_request (information regarding which time slot  
20 is being used).

The messages are obtained from the protocols SCCP (Signalling Connection Control Part), DTAP (Direct Transfer Application Part), BSSMAP (Base Station System Management Application Part) in the A-interface.



A temporary listing is stored in the MSC 5, which includes all mobile users to whom a dial-up is attempted, at all times, and these users/subscribers are hereinafter denoted B-subscribers 9.

- 5 The following A-interface messages are monitored in order to obtain the required information, the nature of the information being indicated in brackets:

8. Paging\_response (B-IMSI)

9. Connection\_confirmed (logical signalling link Id)

10 10. Assignment\_request (information regarding which time slot is being used).

11. Connect\_acknowledge (used as time of concentration for external calls).

When the A-subscriber receives the A-interface message 'connect\_ack' the TDM analyzer 6 will make an inquiry for the B-MS-ISDN number in the above mentioned subscriber database and then check whether the resulting B-IMSI number is on the list of B-subscribers to whom a dial-up is being attempted. If the number is there, the corresponding TDM time slots are cross-  
20 connected in the local switcher 2.

If calls are not to be cross-connected locally, e.g. when the A- and B-subscribers 8, 9 are in different BSS's 1, collected TDM time link information is used to initiate the desired concentration of the TDM time links.

25 All connections of calls and concentrations of TDM time links are controlled by the TDM analyzer 6. TDM time slot informa-

tion for the call in question is used to initiate switching of TDM time slots between the TDM time links on the BSS 1 and MSC 5 side of the local switcher 2 or the remote switcher 4 respectively, and the TDM links transmitted via the satellite  
5 connection 3.

Figure 1 shows an example in which four TDM-links are concentrated down to two TDM-links. Obviously other constellations are possible.

The TDM analyzer 6 stores and maintains a list of all calls  
10 switched through the local switcher 2 and the remote switcher 4 at all times. When a call is terminated, i.e. the A-interface message 'released' is read from the signalling channel for an active call, the TDM analyzer 6 will notify the local switcher 2 and the remote switcher 4 to break the  
15 connections for the call in question.

The relaying of information between the TDM analyzer 6 and the local switcher 2 takes place via a normal TCP/IP network. Likewise, the remote switcher 4 receives information from the TDM analyzer 6 in order to extract the TDM links from the  
20 satellite connection 3 to the total number of TDM links in the system in the correct manner.

The TDM analyzer 6 is arranged so as to keep track of the status of the capacity of the satellite connection 3 and prevent further calls from being set up in the MSC 5 when all  
25 available transmission capacity is in use. This is done by using the TCP/IP network 7.

## C l a i m s

1. A method of switching a speech channel in a mobile telephone system comprising an interface between a Base Station System (BSS) (1) communicating with a Mobile Switching Centre (MSC) (5) via a transmission connection (3), c h a r a c t e r i z e d i n that the speech channels of an originating subscriber (8) and a dialled-up subscriber (9), both of whom are located on the BSS (1) side of the transmission connection (3), are connected in a local switcher (2).
2. A method in accordance with Claim 1, c h a r a c t e r i z e d i n that a signalling channel corresponding to a set of speech channels is monitored by means of an analyzer (6), information regarding the dialled-up subscriber (9) being analyzed in order then to connect the calls in the local switcher if both subscribers (8, 9) are on the same side of the transmission connection (3).
3. A method in accordance with Claims 1 and 2, c h a r a c t e r i z e d i n that a number of transmission links from the BSS (1) are concentrated down to a smaller number of transmission links transmitted via the transmission connection (3), whereupon the smaller number of transmission links is expanded to the original number of transmission links before they are transmitted to the MSC (5).
4. A method in accordance with Claims 1 to 3, c h a r a c t e r i z e d i n that the analyzer (6) monitors the capacity utilization in the transmission connection (3) and prevents the MSC (5) from attempting to set up further calls if the capacity is fully utilized.

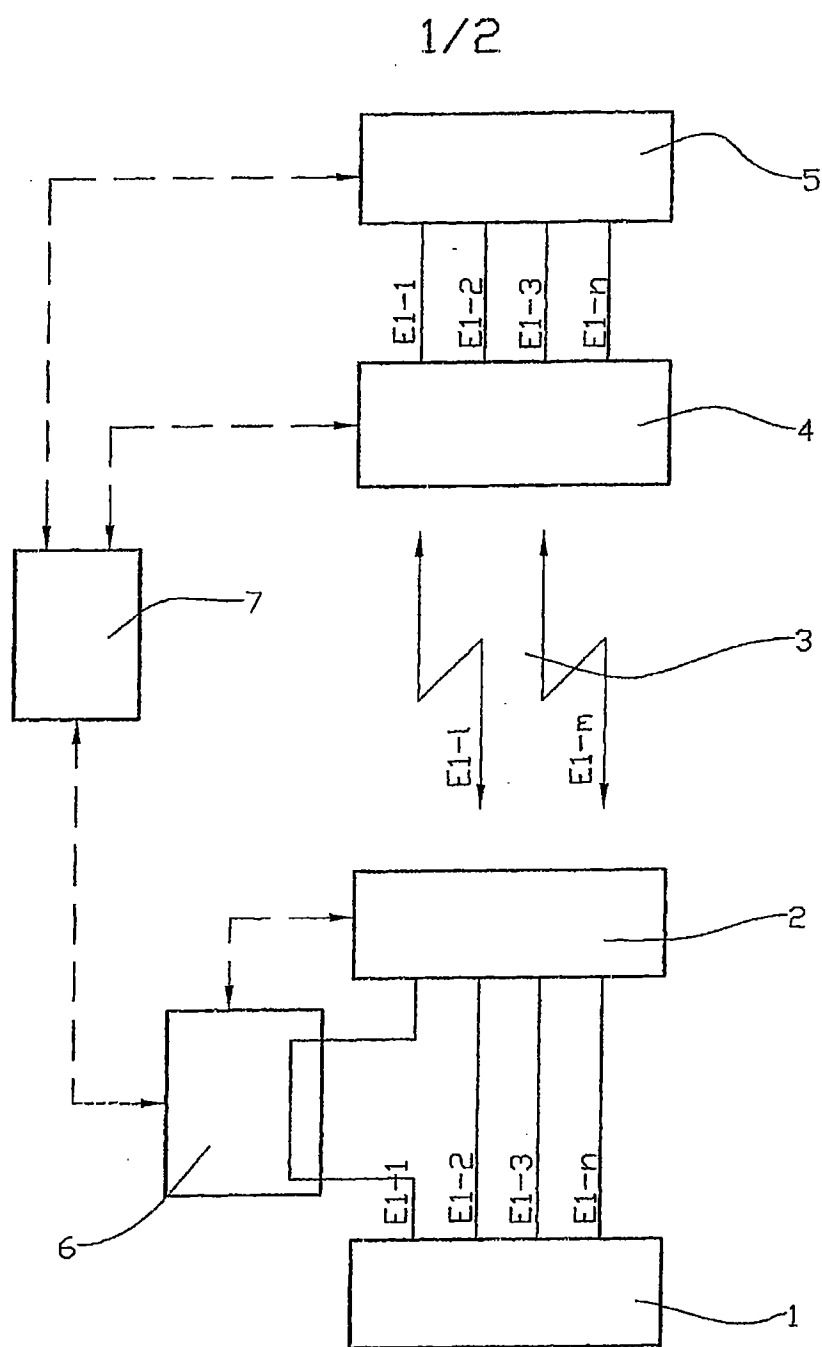


Fig. 1

2/2

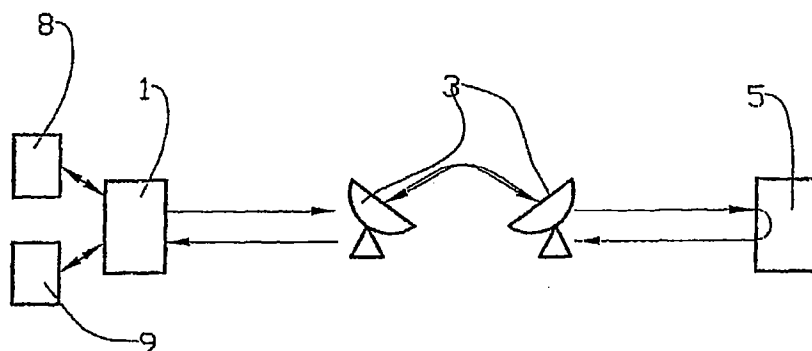


Fig. 2

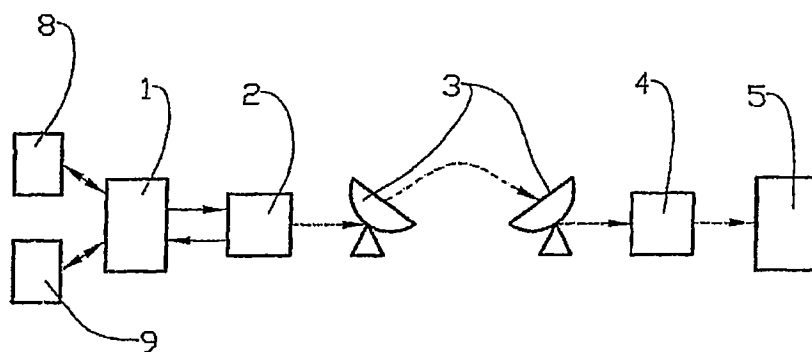


Fig. 3

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/NO 2004/000288

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: H04B 7/185, H04Q 7/22, H04Q 7/30  
According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: H04B, H04M, H04Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched  
SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPD-INTERNAL, WPI DATA

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6141531 A (WILLIAMS, B G ET AL), 31 October 2000 (31.10.2000), column 3, line 41 - line 56, claims 1-22, abstract	1-4
X	GB 2334179 A (MOTOROLA LTD), 11 August 1999 (11.08.1999), page 1, line 24 - page 4, line 24, claims 1-9, abstract	1
Y		2-4
Y	US 20030119512 A1 (NAKASHIMA, H), 26 June 2003 (26.06.2003), claims 1-10, abstract	2-4
A		1

☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier application or patent but published on or after the international filing date	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"G" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search  
20 January 2005

Date of mailing of the international search report  
21-01-2005

Name and mailing address of the ISA/  
Swedish Patent Office  
Box 5055, S-102 42 STOCKHOLM  
Facsimile No. +46 8 666 02 86

Authorized officer  
Roger Bou Faisal /LR  
Telephone No. +46 8 782 25 00

# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/NO 2004/000288

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WD 03046603 A1 (THISS PTY LTD), 5 June 2003 (05.06.2003), claims 1-18, abstract --	1-4
A	US 6138014 A (ALPEROVICH, V ET AL), 24 October 2000 (24.10.2000), claims 1-40, abstract --	1-4
A	US 6169892 B1 (SOLLEE, P), 2 January 2001 (02.01.2001), claims 1-12, abstract -- -----	4

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/NO 2004/000288

US	6141531	A	31/10/2000	AU	8476398	A	15/06/1999
				CN	1283340	T	07/02/2001
				EP	1032990	A	06/09/2000
				US	6374078	B	16/04/2002
				WO	9927666	A	03/06/1999
				US	5995849	A	30/11/1999
-----							
GB	2334179	A	11/08/1999	AU	8640098	A	01/03/1999
				GB	9802366	D	00/00/0000
-----							
US	20030119512	A1	26/06/2003	DE	10260351	A	31/07/2003
				JP	2003199136	A	11/07/2003
				NO	20026227	A	27/06/2003
				SE	522904	C	16/03/2004
				SE	0203812	A	27/06/2003
-----							
WO	03046603	A1	05/06/2003	AU	PR910301	D	00/00/0000
				CA	2468350	A	05/06/2003
				GB	0411713	D	00/00/0000
-----							
US	6138014	A	24/10/2000	AU	3310699	A	15/09/1999
				BR	9908322	A	07/11/2000
				CA	2322268	A	02/09/1999
				WO	9944310	A	02/09/1999
-----							
US	6169892	B1	02/01/2001	NONE			
-----							